



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

09/845,477

04/30/2001

Chine-Gie Lou

TS2000499

2319

28112

7590

12/03/2002

GEORGE O. SAILE & ASSOCIATES
28 DAVIS AVENUE
POUGHKEEPSIE, NY 12603

EXAMINER

GUERRERO, MARIA F

ART UNIT

PAPER NUMBER

2822

DATE MAILED: 12/03/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/845,477

Applicant(s)

LOU, CHINE-GIE

Examiner

Maria Guerrero

Art Unit

2822

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 23 September 2002.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 13-24 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 13-24 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Pri rity under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s) _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

1. This Office Action is in response to the Amendment filed September 23, 2002.

Claims 1-12 are canceled.

Claims 13-24 are pending.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 13-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pey et al. (U.S. 6,180,501) in view of McAnally et al. (U.S. 6,136,700).

Pey et al. teaches providing a semiconductor substrate having: a gate electrode (a pad oxide layer and a polysilicon layer) with gate spacers, shallow trench isolation regions, source and drain regions, and LDD regions (Fig. 1-7, col. 5, lines 1-60). Pey et al. discloses forming an etch stop material (silicon nitride) over the surface of the substrate and patterning the pad oxide layer, the polysilicon layer, and the etch stop material (Fig. 1-2, col. 5, lines 1-15).

Pey et al. teaches forming a salicide layer by depositing a Ti/TiN layer (280 to 350 angstroms) over the surface of the substrate, including the surface of the gate spacers, and performing a first RTP anneal (col. 5, lines 60-67, col. 6, lines 1-10). Pey et al. discloses creating a layer of titanium silicide over the surface of the source and

Art Unit: 2822

drain regions, and removing the unreacted Ti/TiN layer (col. 6, lines 5-15). Pey et al. shows depositing a layer of dielectric (BPSG) over the surface of the layer of etch stop material, polishing the surface of the layer of dielectric down to the surface of the etch stop material, and removing the layer of etch stop material (col. 6, lines 23-50).

Pey et al. teaches depositing a Ti/TiN layer over the surface of the polished layer of dielectric including the exposed surface of the polysilicon layer and performing a second anneal (col. 7, lines 55-60). Furthermore, Pey et al. teaches creating reacted silicide material over the surface of polysilicon, removing the unreacted material, and performing a third RTP anneal at 850°C for about 10 to 30 seconds (col. 6, lines 5-15, col. 7, lines 55-60).

Pey et al. fails to show using a boronitride layer. However, McAnally et al. shows using a boronitride layer as a stopping layer in order to increase the etch selectivity (col. 3, lines 17-25, col. 4, lines 15-20, col. 5, lines 25-30).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Pey et al.'s process by using boronitride instead of silicon nitride as taught McAnally et al. The modification would reduce the possibility of a short between the polysilicon and the subsequently formed silicide layer (McAnally et al., col. 5, lines 32-38).

Regarding the claimed thickness, temperature, and time, a particular parameter must first be recognized as a result-effective variable, i.e., a variable, which achieves a recognized result, before the determination of the optimum or workable ranges of, said variable might be characterized as routine experimentation. In re Aller, 220 F.2d 454,

Art Unit: 2822

456, 105 USPQ 233, 235 (CCPA 1955). *In re Geisler*, 116 F.3d 1465, 1471, 43

USPQ2d 1362, 1366 (Fed. Cir. 1997).

Response to Arguments

3. Applicant's arguments filed September 23, 2002 have been fully considered but they are not persuasive. The objections to the Specification and claims are withdrawn. Claims 13-24 stand rejected.

In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., the polishing selectivity for photoresist/BN is larger than about 200) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

In response to applicant's argument that McAnally et al. uses the boron nitride as an etch stop layer, the test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981).

Conclusion

4. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Bartush (U.S. 5,365,866) teaches the use of a boron nitride polish stop layer as well known in the art. Stanley Wolf (of record) "Silicon Processing for the VLSI Era" teaches, as well known in the art, rapid thermal processing at 600-800°C to form a silicide layer, selectively removed the unreacted Ti, annealing the titanium silicide at temperature of 1000°C. for 30 seconds to reduce the titanium silicide resistivity (page 148).

5. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Maria Guerrero whose telephone number is 703-305-0162.

Art Unit: 2822

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amir Zarabian can be reached on 703-308-4905. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 for regular communications and 703-308-7724 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

MG
MG

November 19, 2002



AMIR ZARABIAN
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800